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UREDINALES OF PORTO RICO BASED ON COLLECTIONS BY F. L. STEVENS¹

J. C. ARTHUR

SPECIES REPORTED FROM PORTO RICO NOT REPRESENTED ABOVE

110. RAVENELIA PORTORICENSIS Arth., on *Cassia emarginata* L. (*Caesalpiniaceae*), Ponce, Dec. 3, 1902, A. A. Heller 6193. Also in Jamaica on *Cassia* sp.
111. HEMILEIA VASTATRIX B. & Br. on *Coffea arabica* L. (*Rubiaceae*), said to have once been found, and subsequently exterminated.
112. TRANZSCHELIA PUNCTATA (Pers.) Arth. (*Puccinia Prunispinosae* Pers.), on *Amygdalus persica* L. (*Amygdalaceae*), Mayagüez, May, 1903, F. S. Earle 83. Also in Bermuda on same host.
113. UROMYCES COLOGANIAE Arth., II, on *Teramnus uncinatus* Sw. (*Fabaceae*), Cayey, mountain side north of city, January, 1911, E. W. D. Holway.
114. UROMYCES HOWEI Peck, on *Asclepias curassavica* L. (*Asclepiadaceae*), Comercio, February, 1911, E. W. D. Holway.
115. UROMYCES PAVONIAE Arth., on *Pavonia racemosa* L. (*Malvaceae*), Mayagüez and Joyua, June-July, 1901, L. M. Underwood 193.
116. PUCCINIA PURPUREA Cooke, on *Holcus Sorghum* L. (*Sorghum vulgare* Pers.) (*Poaceae*), La Carmelita, April, 1904, G. P. Clinton; Rio Piedras, May, 1912, Cowgill & Johnston 505. Also on same host in Cuba; on *Holcus halepensis* L. (*Sorghum halepense* L.) in Cuba and Jamaica; and on *Sorghum officinarum* L. in Bermuda.
117. PUCCINIA SCIRPI DC. (*Aecidium Nymphoidis* DC.), on *Scirpus lacustris* L. (*Cyperaceae*), in a meadow near Guanica, Dec. 15, 1902, A. A. Heller 6291. The aecia

¹ Continued from MYCOLOGIA 7: 332. 1915.

were collected by Charles Wright on *Limnanthemum Grayanum* Griseb. (*Menyanthaceae*), in Pinar del Rio, Cuba, December, 1857 or 1858. No other West Indian stations are known.

118. *Puccinia Cordiae* sp. nov.

Uredinia hypophyllous, scattered, sometimes in coalescent groups of a few sori each, round, 0.2–0.4 mm. across, dark cinnamon-brown; paraphyses peripheral, hyphoid, 10–18 by 45–75 μ , the wall thin, 1 μ , colorless; urediniospores broadly ellipsoid or globoid, 21–25 by 28–35 μ ; wall golden-brown, 1.5–2 μ thick, usually thicker above, 5–12 μ , often somewhat thickened at hilum, closely verrucose, the pores indistinct, probably 3 or 4, equatorial.

Telia resembling uredinia but darker color, chestnut-brown; teliospores ellipsoid, 19–26 by 37–55 μ , rounded at both ends, not constricted at septum; wall dark chestnut-brown, uniformly thick, 2.5–3 μ , or slightly thicker above, very coarsely and sparsely verrucose, especially above; pedicel colorless, 6–9 by 30–40 μ , hygroscopic near base, swelling in water to 20 μ in diameter.

ON EHRETIACEAE:

Cordia alliodora (R. & Pav.) Cham., Ponce, January, 1911, E. W. D. Holway.

A rust on *Cordia* sp. from Peru has been described by Hennings under the name *Uredo Cordiae* (Hedwigia 43: 163. 1904). The morphological characters are similar, but in habit it is said to produce gall-like swellings in the leaves and shoots resulting in witches-brooms, while the material from Porto Rico shows nothing of this sort.

119. PUCCINIA XANTHII Schw. on XANTHIUM LONGIROSTRE Wallr. (*Ambrosiaceae*), San Juan, February, 1914, Britton and Cowell 1485; Santurce, February, 1914, J. R. Johnston 1338. Also in Cuba and St. Domingo on same host.

120. UREDO SUPERIOR Arth. on *Fimbristylis spadicea* (L.) Vahl (*Cyperaceae*), low ground along the coast, eight miles west of Ponce, Dec. 12, 1902, A. A. Heller 6279. Also reported by Mayor (l. c., p. 581) from Haiti on same host.

121. UREDO ARTOCARPI B. & Br. (*Physopella* (?) *Artocarpi* Arth.) on *Artocarpus communis* Forst. (*Artocarpaceae*), Mayagüez, April, 1904, G. P. Clinton 162. Only American station known.

122. UREDO GYNANDREARUM Corda, on *Habenaria maculosa* L. (*Orchidaceae*), Cataño, January, 1911, C. F. Millsbaugh 257. Also on same host, El Yunque, Cuba, December, 1910, J. A. Shafer 7992. Both specimens were found in the phanerogamic collection at the New York Botanical Garden.

SPECIES REPORTED FROM THE WEST INDIES BUT NOT KNOWN
FROM PORTO RICO

123. COLEOSPORIUM EUPATORII Arth., on *Eupatorium macrophyllum* L. (*Carduaceae*), Cuba.
124. ALVEOLARIA CORDIAE Lagerh., on *Cordia cylindrostachya* R. & S. (*Ehretiaceae*), Jamaica.
125. RAVENELIA HUMPHREYANA P. Henn., on *Poinciana pulcherrima* L. (*Caesalpinaceae*), Cuba, Jamaica.
126. RAVENELIA PAPILLIFERA Sydow, on *Cassia angustisiliqua* Lam. (*Caesalpinaceae*), Bahamas.
127. CALLIOSPORA FARLOWII Arth., on *Parosela domingensis* (DC.) Heller (*Fabaceae*), Cuba.
128. PROSPIDIUM BAHAMENSE Arth., on *Tecoma Leucoxylon* (L.) Mart. (*Bignoniaceae*), Bahamas.
129. PROSPIDIUM PLAGIOPUS (Mont.) Arth. (*Puccinia plagiopus* Mont.) on *Tecoma lepidota* (H. B. K.) DC. (*Bignoniaceae*), Cuba.
130. NEPHLYCTIS TRANSFORMANS (Ellis & Ev.) Arth. (*Puccinia transformans* Ellis & Ev., *P. exitiosa* Syd. & Holw.), on *Stenolobium Stans* (L.) D. Don (*Tecoma Stans* Juss.) (*Bignoniaceae*), Bahamas, Cuba.
131. GYMNOSPORANGIUM BERMUDIANUM (Farl.) Earle, on *Juniperus bermudiana* L. (*Juniperaceae*), Bermuda, on *J. lucayana* Britt., Bahamas.
132. ERIOSPORANGIUM EVADENS (Harkn.) Arth., on *Baccharis* sp. (*Carduaceae*), Cuba.
133. UROMYCES MEDICAGINIS Pass. (*Nigredo Medicaginis* Arth.) on *Medicago denticulata* Willd. (*Fabaceae*), Bermuda.
134. UROMYCES TRIFOLII (Hedw. f.) Lév. (*Nigredo Trifolii* Arth.) on *Trifolium repens* L. (*Fabaceae*), Jamaica.

135. PUCCINIA CLADII Ellis & Tracy, on *Mariscus jamaicense* (Crantz) Britt. (*Cladium effusum* Torr.) (*Cyperaceae*), Bermuda.
136. PUCCINIA OXALIDIS (Lév.) Diet. & Ellis (*Argomyces* (?) *Oxalidis* Arth.), on *Ionoxalis Martiana* (Zucc.) Small (*Oxalidaceae*), Jamaica.
137. PUCCINIA OPULENTA Speg., on *Exogonium arenarium* (Steud.) Choisy (*Ipomoea arenaria* Steud., *I. Steudeli* Millsp.) (*Convolvulaceae*), St. Thomas, March, 1913, J. N. Rose.
138. PUCCINIA SPILANTHIS P. Henn., on *Spilanthes oleracea* Jacq. (*Carduaceae*), Martinique.
139. PUCCINIA SPEGAZZINII DeT., on *Mikania scandens* (L.) Willd. (*Carduaceae*), Martinique, Aug. 4, 1913, F. L. Stevens 2971.
140. UREDO ANTHEPHORAE Sydow, on *Anthephora hermaphrodita* (L.) Kuntze (*A. elegans* R. & S.) (*Poaceae*), Cuba.
141. UREDO HELICONIAE Diet., on *Bihai psittacorum* (L. f.) Kuntze (*Heliconia psittacorum* L. f.) (*Scitamineae*), Martinique, Aug. 4, 1913, F. L. Stevens 2967.
142. UREDO WILSONI Arth., on *Anastrophia bahamensis* Urban (*Podostemaceae*), Bahamas.

APPENDIX

Since the study was completed of Professor Stevens' Porto Rican collections of 1912-14, and a large part of the article in type, additional collections made by Professor Stevens during June, July and August, 1915, have come to hand. In this supplementary lot of Porto Rican material there are some 254 numbers, representing about 78 species. A part of the new material, as would be expected, duplicates that previously secured, but in many instances it was obtained in new localities. In some cases a species was found not previously known from Porto Rico, or on an unrecorded Porto Rican host. The new material has, furthermore, proved surprisingly rich in species heretofore quite unknown to science.

In order to make the account of the Porto Rican rusts as com-

plete as possible, the species and hosts from the new material, not mentioned in the preceding part as occurring in Porto Rico, are here appended. In order to conserve space the remainder of the 1915 material is not cited, although many additional localities are represented.

Two species were added to the previous supplementary lists, after the statistics on pages 170 and 171 were in type. One was a Porto Rican species and the other from another West Indian island. The collections of 1915 here recorded add 12 species to the foregoing record of Porto Rican rusts. The total number of species of rusts now known from Porto Rico is brought up to 135, and from all the West Indian islands to 155. Of this large rust flora Professor Stevens secured during his twenty-four months' sojourn in the West Indies all but eleven of the known species from Porto Rico, and all but thirty from the whole West Indian flora. Truly a remarkable record. His collections supplied twenty species new to science and an equal number of additional species not previously recorded for North America, beside many new hosts.

ADDITIONAL SPECIES. FROM PORTO RICO

143. RAVENELIA CEBIL Speg., on *Piptadenia peregrina* (L.) Benth. (*Caesalpinaceae*) Peñuelas, July, 1915, II, 9139. No authentic material of this South American species has been seen, but the ample Porto Rican material, so far as uredinia are concerned, agrees closely with Spegazzini's excellent description (An. Mus. Nac. B. Aires 19: 295. 1909). The Porto Rican host, *P. peregrina*, is placed by Engler & Prantl in the same third section of the genus *Piptadenia* as the Argentine type host, *P. macrocarpa*, evidencing near relationship. The assignment of the collection is, therefore, made with considerable confidence, although the telia are absent.
144. RAVENELIA CASSIAECOLA Atks., on *Chamaecrista Aeschynomene* (DC.) Greene (*Caesalpinaceae*), El Gigante, July 16, 1915, II, 8505. Heretofore this rust has been known only from the southeastern United States.
145. PUCCINIA CYNODONTIS DeLac., on *Capriola Dactylon* (L.)

- Kuntze (*Cynodon Dactylon* Pers.), (*Poaceae*), Rio Piedras, June 11, 1915, II, 7009, Mayagüez, June 16, 1915, II, 7114.
146. *UREDOPUSTULATA* P. Henn., on *Stenorrhynchus lanceolatus* (Aubl.) Griseb. (*Orchidaceae*), Las Marias, July 10, 1915, 8185. The first record of this species for North America, hitherto known only in Brazil.
147. *UREDOPUSTULATA* Mayor, on *Epidendrum difforme* Jacq. (*Orchidaceae*), Jejome Alto, July 17, 1915, 8434, Bandera, July 15, 1915, 8669. The same rust was collected on *Epidendrum rigidum* Jacq. at Summit Pass, south of Cayey, P. R., January, 1911, by E. W. D. Holway. It has not before been recognized as a part of the North American flora.

148. *Uredo venustula* sp. nov.

Uredinia hypophyllous, scattered, oblong or linear, 0.1–0.2 mm. broad by 0.3–0.8 mm. long, early naked, chestnut-brown, ruptured epidermis evident; paraphyses numerous, prominent upright, clavate-capitate, 16–20 by 40–55 μ , the wall chestnut-brown above, paler below, 1.5–3 μ along the stalk, 6–10 μ above; urediniospores broadly ellipsoid or globoid, 18–23 by 22–27 μ ; wall light chestnut-brown, 1–1.5 μ thick, closely and finely echinulate, the pores quite distinct, 4, equatorial.

ON POACEAE:

Andropogon brevifolius Sw., Las Marias, July 10, 1915, 8147.

A distinctive rust, with prominent sori, due to the great abundance of very dark paraphyses. The species is similar to *Uredo Kaernbachii* P. Henn., on *Andropogon Schoenanthus*, known only from the Bismark archipelago in the south seas. The color and size of both urediniospores and paraphyses are not materially different in the two forms, but the West Indian species has much thinner walls to the spores, and the sori are more prominent. Although both are on tropical grasses of wide distribution, yet they belong to different sections of the host genus, or to different genera according to some authors.

149. *UREDOLYRAE* P. Henn., on *Oplismenus hirtellus* (L.) R. & S. (*Poaceae*), Las Marias, July 10, 1915, 8118. The

thick-walled and coarsely echinulate spores without paraphyses readily distinguish this species from related forms. The type collection, with which the Porto Rican material has been compared, is from Peru, and on an undetermined species of *Olyra*. This is the second record for the species.

150. *UREDIO ANTHURII* Hariot, on *Anthurium scandens* (Aubl.) Engler (*Araceae*), El Alto, July 16, 1915, 8716. The host ranges from Mexico to Brazil. The fungus was described (Jour. de Bot. 1892, p. 458) from material collected on an undetermined species of *Anthurium* in the greenhouses of the Jardin des Plantes in Paris. The present record is probably the first of a collection from the field. The fungus on the Porto Rican material may be described as follows: Uredinia chiefly hypophyllous, scattered, or somewhat grouped on slightly discolored spots, bullate, the membranous epidermis tardily breaking away, pale, somewhat pulverulent, 0.5–0.8 mm. across; paraphyses and peridium none; urediniospores irregularly obovoid, 18–26 by 29–37 μ ; wall colorless or nearly so, thin, 1–1.5 μ , moderately echinulate, pores not visible.

151. *Uredo globulosa* sp. nov.

Uredinia chiefly hypophyllous, numerous over the whole length of the leaf, 2–5 on well-defined, purplish-black spots, 0.5–1 mm. across, or singly without discoloration, bullate, in cross-section depressed-globose, 65–80 μ high by 150–325 μ broad, somewhat smaller when solitary; peridium usually deeply discolored, sharply delimiting the sorus from the rather loose leaf-tissue, opening by a central orifice, the cells polygonal, with walls about 2 μ thick; urediniospores stylosporic, broadly obovoid, 15–19 by 20–26 μ ; wall colorless or nearly so, thin, about 1.5 μ , finely and closely echinulate, the pores obscure.

ON AMARYLLIDACEAE:

Hypoxis decumbens L., Las Marias, July 10, 1915, 8127 (type), Bandera, July 15, 1915, 8577, 8630.

This distinctive rust is especially notable by reason of the pedicellate spores borne in a delicate, sac-like peridium, which becomes filled with the detached spores, the whole structure lying

loosely in the tissues of the host, from which it is usually sharply defined by a deep stain. Careful search was made for telia, without success.

The same species of rust and on the same species of host was collected by E. W. D. Holway in Jalapa, Mexico, October 3, 1898, 3090.

152. *UREDIO PIPERIS* P. Henn., on *Peperomia hernandifolia* (Vahl) A. Dietr. (*Piperaceae*), Bandera, July 14, 1915, 8295. The excellent material secured by Professor Stevens is placed under this Brazilian species with some hesitation, as the type has not been seen. The applicable description (Hedw. Beibl. 38: 70. 1899), and the close relationship of the two tropical host genera, *Piper* with its 600 species, and *Peperomia* with its 400 species, however, seem to warrant the use of the name. There is a *Uredo Peperomiae* P. Henn. from Brazil, which is a distinctly different fungus.

153. *Uredo Sauvagesiae* sp. nov.

Uredinia hypophyllous, grouped on blackish-purple spots, 1-3 mm. across, round, small, 0.1 mm. in diameter, ruptured epidermis prominent, dark cinnamon-brown, subepidermal; urediniospores ellipsoid or obovoid, 17-20 by 24-27 μ ; wall cinnamon-brown, thin, 1-1.5 μ , closely and finely echinulate, the pores indistinct, probably two and equatorial.

ON OCHNACEAE:

Sauvagesia erecta L., Jejome Alto, July 17, 1915, 8376.

The host is a common tropical plant occurring around the world. No rust has heretofore been reported upon it, or upon any member of the family. The sorus is of the usual applanate sort common to the *Aecidiaceae*, without paraphyses.

154. *Uredo Hameliae* sp. nov.

Uredinia epiphyllous, loosely grouped on indefinite, slightly paler and unthickened spots 1-1.5 cm. across, applanate, round, small, 0.2-0.4 mm. across, pale cinnamon-brown; urediniospores globoid or short obovoid, 15-21 by 19-24 μ ; wall pale yellowish, thin, 1 μ , distinctly echinulate with points 1-1.5 μ apart, the pores uncertain, possibly 2 and equatorial.

ON RUBIACEAE:

Hamelia erecta Jacq. (*H. patens* Jacq.), Lajos, June 17, 1915.

The material shows good development of this rather inconspicuous rust. No closely related form is known. The host genus is American; the species extends from Mexico and the West Indies to Patagonia.

155. *PUCCINIA FARINACEA* Long, on *Salvia coccinea* B. Juss. (*Lamiaceae*), El Gigante, July 16, 1915, 8530. The second time the host has been reported for this rust, the first collection of it being made in Texas in 1898.

CHANGE IN NAME AND ADDED DESCRIPTION

- 109a. *Schroeteriaster fenestrala* (Arth.) comb. nov.

Uredo fenestrala Arth., Mycologia 7: 332. 1915.

II. Uredinia, l. c.

III. Telia hypophyllous, abundant, scattered, or somewhat aggregated on yellowish, indefinite spots, punctiform, slightly elevated, dark or even blackish brown, 0.1–0.25 mm. across, subepidermal, lenticular, firm; teliospores imperfectly catenulate in chains of 2–4, closely compacted, oblong, 10–16 by 23–27 μ ; wall light cinnamon-brown, thin, 1–1.5 μ , outer wall of terminal spores thicker, 3–5 μ , smooth.

ON EUPHORBIACEAE:

Phyllanthus grandifolius L., Martin Pena, Aug. 11, 1915, 9314.

It is most fortunate that Professor Stevens was able this season to find more complete material of this interesting rust. The telia on the present collection, which consists of about twenty leaves, are abundant and well matured. They bear out the prediction, made in the introduction (p. 170), as to the genetic position.

ADDITIONAL HOSTS FOR PORTO RICAN SPECIES

- 15a. *ARGOMYCES VERNONIAE* Arth., on *Vernonia albicaulis* Pers., Bandera, July 15, 1915, 9048. This makes the third species of host recorded for the rust.
- 18a. *UROMYCES IGNOBILIS* (Syd.) Arth., on *Sporobolus virginicus* (L.) Kunth, Camuy, Aug. 10, 1915, II, 9230. A new host for this rust.
- 20a. *UROMYCES SCLERIAE* P. Henn., on *Scleria canescens* Boeckl., Jejome Alto, July 17, 1915, 8437, El Alto, July 16, 1915, 8684.

- 28a. UROMYCES PROEMINENS (DC.) Pass., on *Chamaesyce hypericifolia* (L.) Small, Lajas, June 18, 1915, 7171.
- 34a. UROMYCES BIDENTIS Lagerh., on *Bidens pilosa* L., Arecibo and Lares Road, June 21, 1915, 7311, Rio Piedras, Aug. 11, 1915, 9291, Tanama river, July 6, 1915, 7899, Maricao, July 20, 1915, 8979.
- 38a. PUCCINIA CENCHRI Diet. & Holw., on *Cenchrus carolinianus* Walt., Camuy, Aug. 10, 1915, II, 9232.
- 40a. PUCCINIA HUBERI P. Henn., on *Panicum fasciculatum* Sw., Tanama river, July 6, 1915, II, 7816.
- 41a. PUCCINIA LEVIS (Sacc. & Bizz.) Magn., on *Paspalum fimbriatum* H. B. K., Cabo Rojo, July 29, 1915, II, 9074.
- 42a. PUCCINIA SUBSTRIATA Ellis & Barth., on *Chaetochloa imberbis* (Poir.) Scribn., without locality, August, 1915, 9182.
- 43a. PUCCINIA CANALICULATA (Schw.) Lagerh., on *Cyperus odoratus* L., San José Lagune, Aug. 10, 1915, 9223, 9224; Rio Piedras, Aug. 11, 1915, 9289; *C. distans* L., without locality, 1915, 9192a.
- 44a. PUCCINIA ELEOCHARIDIS Arth., on *Eleocharis flaccida* (Spr.) Urban, Banderó, July 15, 1915, II, 9045; *E. mutata* (L.) R. & S., Guanajibo, June 19, 1915, II, 7198, San José Lagune, Aug. 10, 1915, 9192; *E. capitata* (L.) R. Br., San José Lagune, Aug. 10, 1915, 9227, Martin Pena, Aug. 11, 1915, 9301.
- 47a. PUCCINIA CANNAE (Wint.) P. Henn., *Calathea lutea* (Aubl.) Mey. (*Marantaceae*) Mayagüez, June 29, 1915, 7583. The first record for a rust on this host.
- 67a. PUCCINIA LATERITIA Berk. & Curt., on *Spermacoce riparia* C. & S., Aquadilla, June 20, 1915, 7257.
- 70a. PUCCINIA SYNDRELLAE P. Henn., on *Neurolaena lobata* (L.) R. Br., Florida Adentro, July 7, 1915, 7659. The rust on this host, heretofore only known from Cuba, was also found by Mr. Percy Wilson in the phanerogamic herbarium of the New York Botanical Garden on a specimen from Panama, collected April 13, 1908, by R. S. Williams.
- 99a. UREDO GYMNOGRAMMES P. Henn., on *Adiantum latifolium* Lam., Las Marias, July 10, 1915, 8178.

121a. UREDO ARTOCARPI B. & Br., on *Artocarpus Camansi* Blanco, without locality, August, 1915, 9179. Some slight uncertainty exists regarding the host, as no flowers or fruit accompanied the material.

In order to make the foregoing rust flora of the West Indies more serviceable as a reference work an index has been prepared for the more than three hundred fungous names and the considerably more than four hundred host names.

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